EECS 562

Homework 8

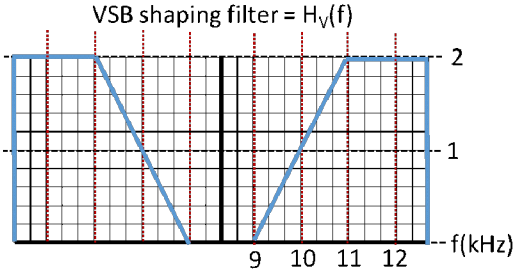
1. Let $x_{bb}(t)$ = 4cos(2π400t)+3cos(2π450t)+2.5cos(2π500t)
This signal is input to an SSB modulator with f_c=5000Hz that uses the upper sideband.

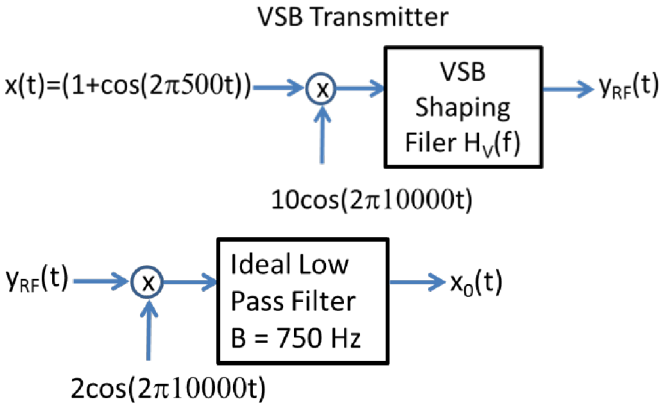
a. Plot the RF Spectrum of the SSB signal.
b. What is the required RF Bandwidth?
c. A coherent detector is required to recover m(t) from the RF signal. TRUE or FALSE
d. Mathematically show how the message signal is recovered.
e. Draw the block diagram for a receiver for this SSB signal.

2. Watch "8VSB, From Transport Stream to RF Signal"
https://www.youtube.com/watch?v=ZlAjfA-hU_8

a. What does the 8 refer to in 8VSB?
b. How is most of the lower sideband removed?
c. 8VSB uses a synchronous receiver, TRUE or FALSE.
d. Mathematically explain how shifting the signal by 1.25 V generates the pilot signal.

3. In this problem the information signal is x_{bb}(t)=1+cos(2π500t). Let the input to the VSB shaping filter given below be 10(1+cos(2π500t))cos(2π10000t), here f_c=10kHz. Let y_{RF}(t) be signal at the output of the VSB shaping filter as shown below. The VSB receiver is also given below.





a. Sketch the spectrum of y_{RF}(t), i.e., the signal at the output of the VSB shaping filter.

b. Find the output signal, x_o(t), of the receiver.